

FIG. 1 (PRIOR ART)

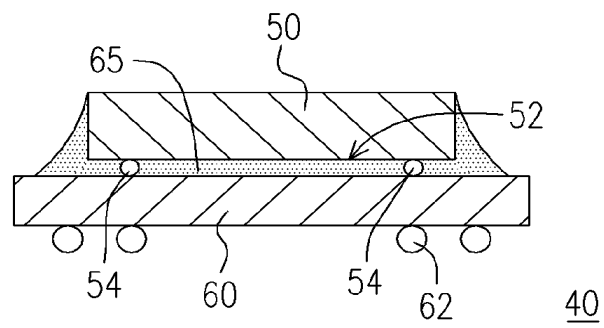


FIG. 2 (PRIOR ART)

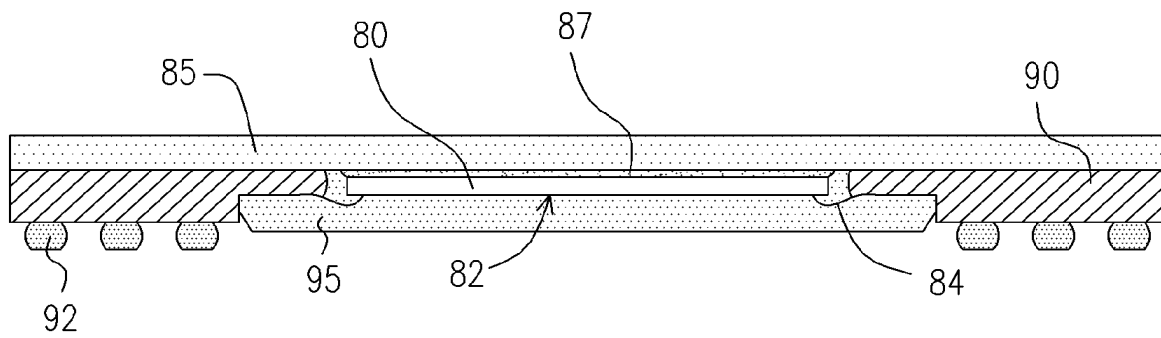


FIG. 3 (PRIOR ART)

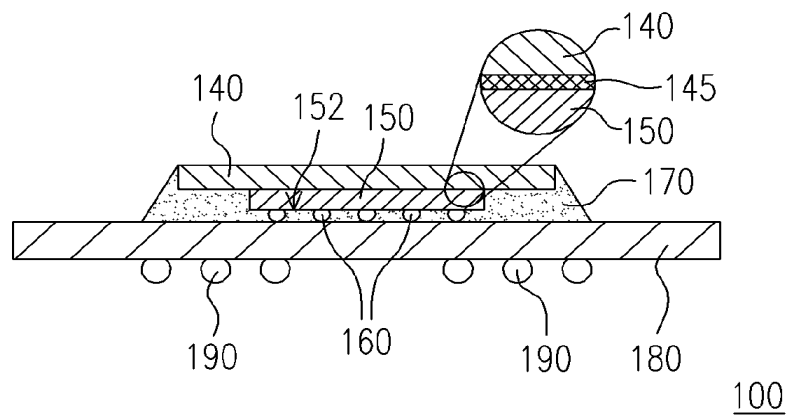


FIG. 4A

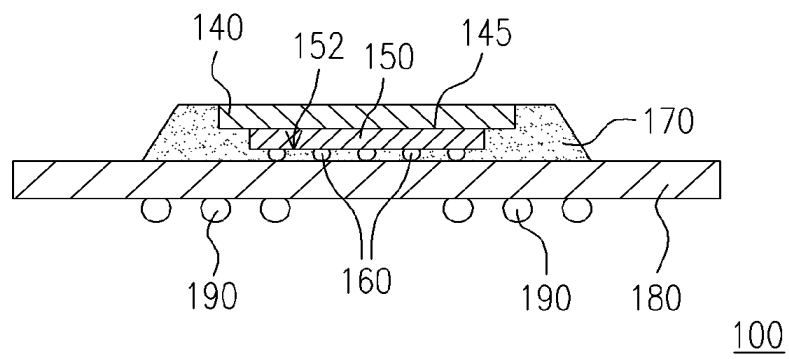


FIG. 4B

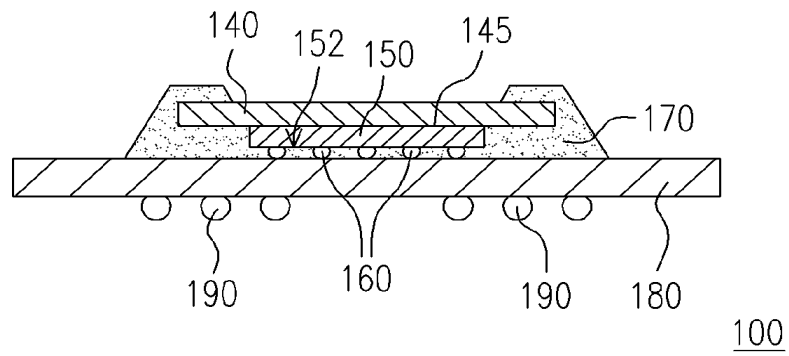


FIG. 4C

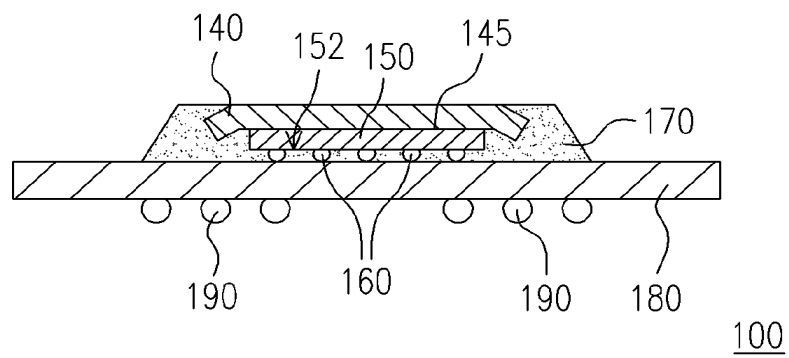


FIG. 4D

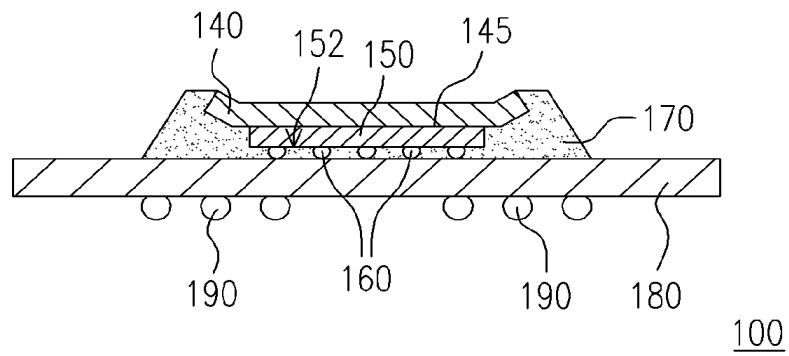


FIG. 4E

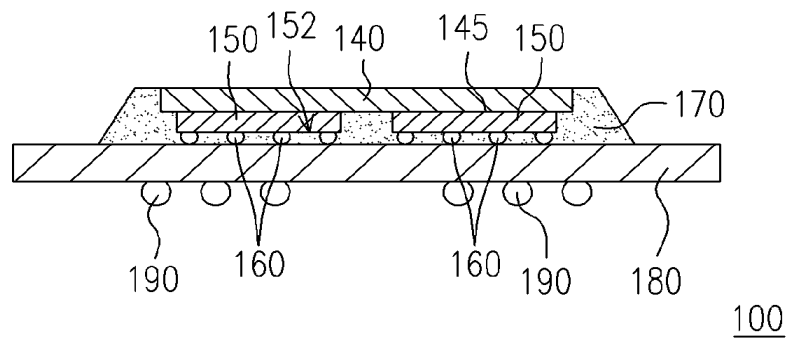


FIG. 4F

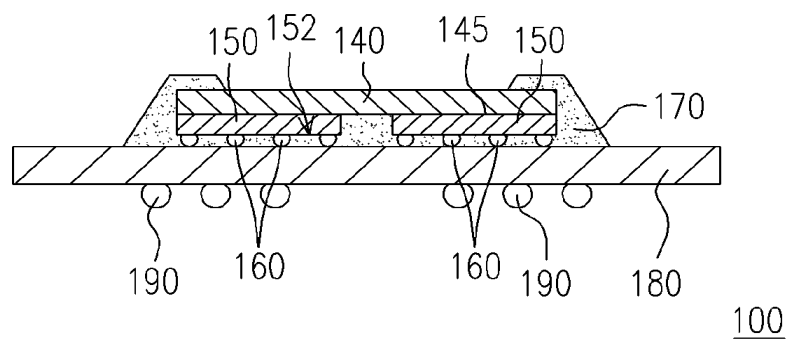


FIG. 4G

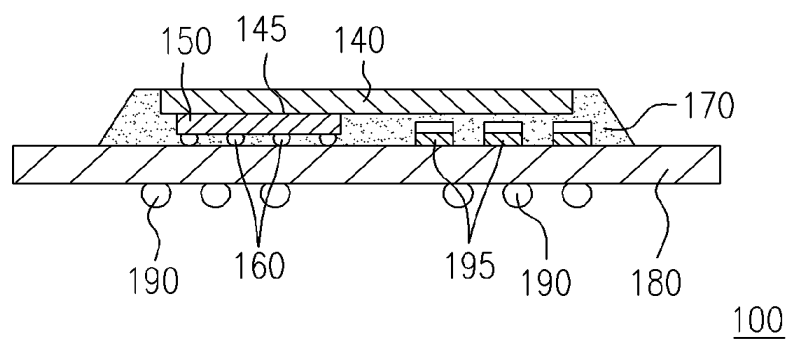


FIG. 4H

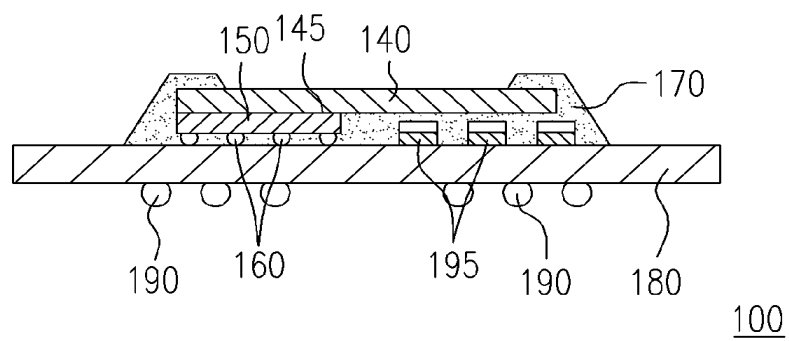


FIG. 4I

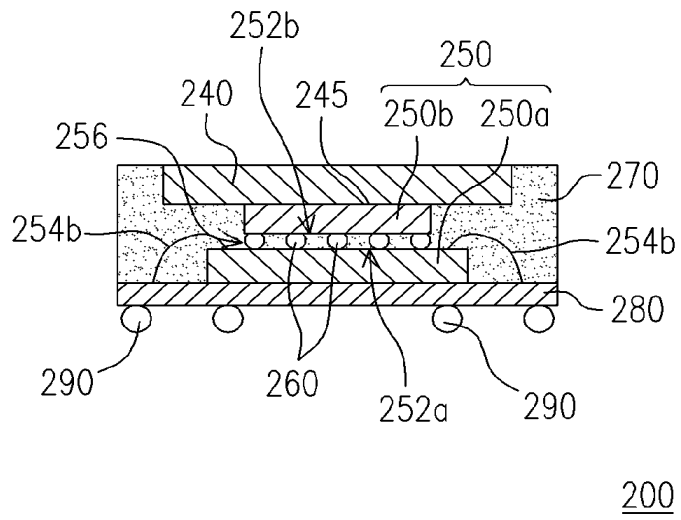


FIG. 5

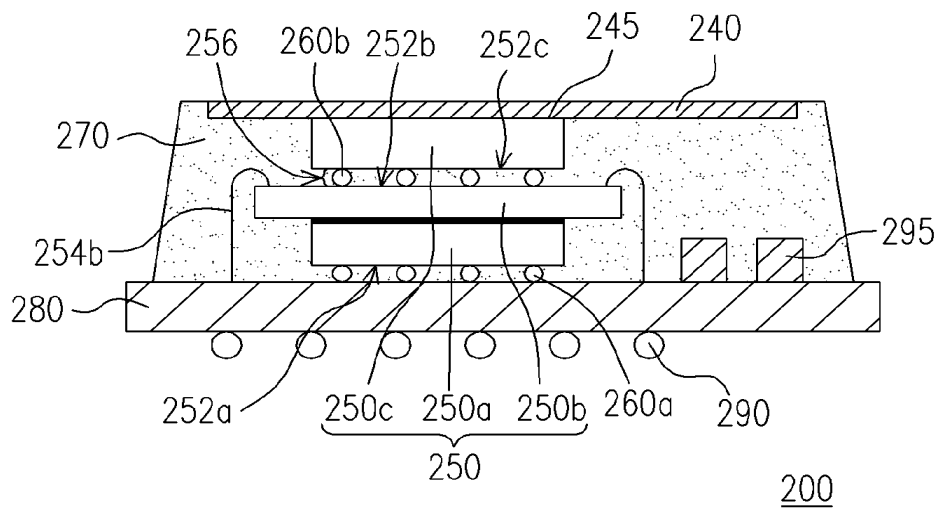


FIG. 6

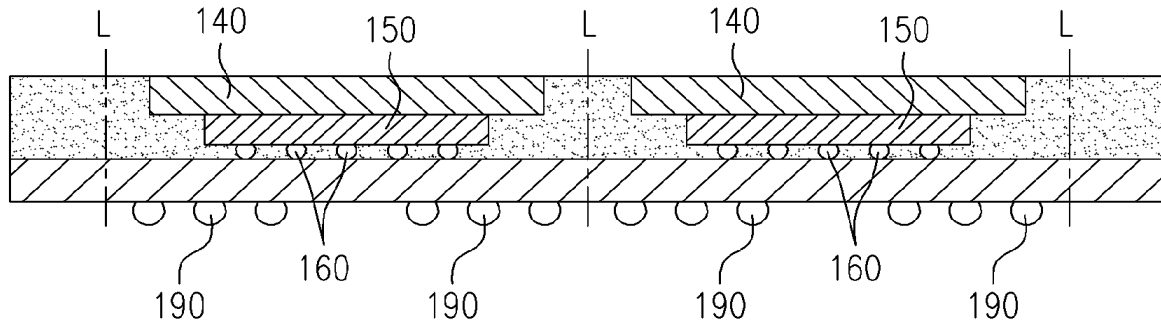


FIG. 7A

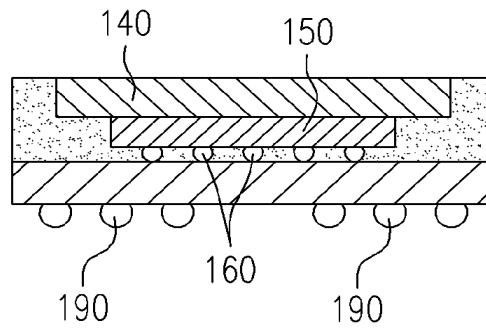


FIG. 7B

100

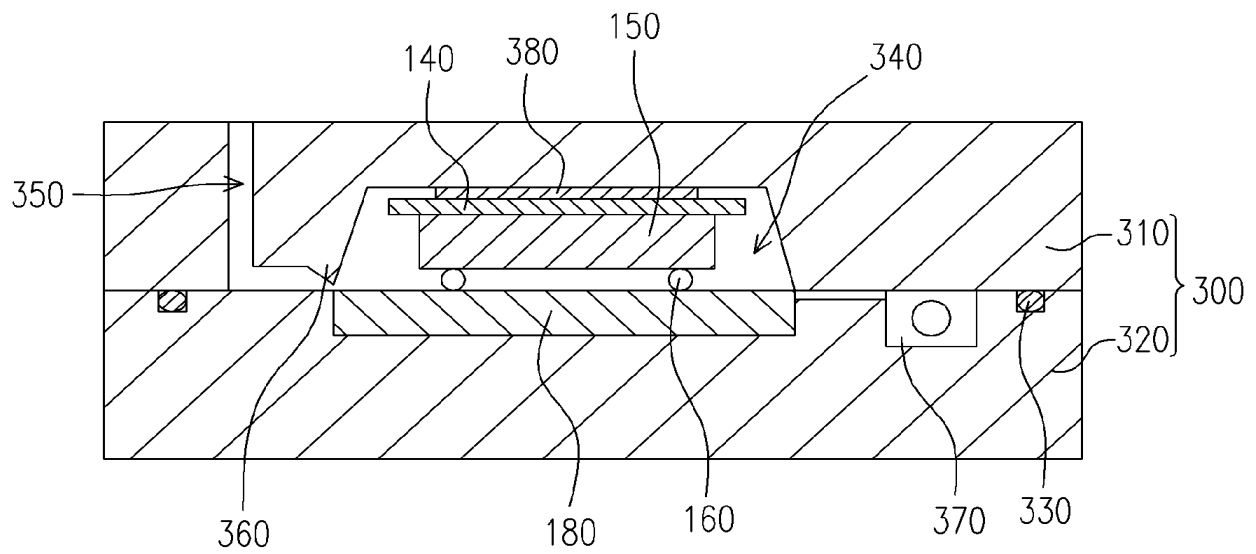


FIG. 8

	Examples 1, 6 – 8 and contrast examples 1, 5 and 6	Contrast example 2	Example 2	Example 3
Molding Temperature	170°C	170°C	170°C	170°C
Degree of Vacuum	1 mmHg	Atmospheric Pressure	15 mmHg	80 mmHg
Encapsulating Material Category (Silica) *1	A	A	A	A

	Example 4	Example 5	Contrast example 3	Contrast example 4
Molding Temperature	160°C	180°C	170°C	170°C
Degree of Vacuum	1 mmHg	1 mmHg	1 mmHg	1 mmHg
Encapsulating Material Category (Silica) *1	A	A	B	C

*1 Encapsulating material A: average particle diameter 5μm
maximum particle diameter 21 μm
Encapsulating material B: average particle diameter 13μm
maximum particle diameter 40μm
Encapsulating material C: average particle diameter 13μm
maximum particle diameter 74μm

Fig. 9

	Example 1	Contrast example 1	Contrast example 2	Example 2	Example 3	Example 4	Example 5
Metallic surface flush	OK	OK	OK	OK	OK	OK	OK
Flip-chip bonding gap filling capacity *2	100%	100%	15%	99%	97%	100%	100%
Solder persistence *3	▲	O	X	O	O	▲	▲
Temperature recycle reliability *4	2000 cycles	500 cycles	--	2000 cycles	2000 cycles	2000 cycles	2000 cycles
PCT Reliability *5	>500 hours	168 hours	--	>500 hours	>500hour	>500 hours	>500 hours
Others							@

	Contrast example 3	Contrast example 4	Example 6	Example 7	Example 8	Contrast example 5	Contrast example 6
Metallic surface flush	OK	OK	OK	OK	OK	Maximum 2mm	OK
Flip-chip bonding gap filling capacity *2	40%	30%	100%	100%	100%	100%	100%
Solder persistence *3	X	X	▲	▲	▲	▲	▲
Temperature recycle reliability *4	--	--	2000 cycles	2000 cycles	2000 cycles	2000 cycles	--
PCT Reliability *5	--	--	>500 hours	>500 hours	>500 hours	>500 hours	--
Others							

*2 relative to chip area, material filling area ratio (filling capacity) average value using SAT criteria

*3 solder persistence: ▲ : JEDEC level II passed; O : JEDEC level III passed; (n = 11) X : JEDEC level III failed

*4 temperature recycle reliability: gaseous surrounding, 65°C/15min ~ 150°C/15min (n = 11)

*5 PCT reliability 121°C/2atms

@ assessed using a total of 32 molded devices, 2 defective devices/remaining non-defective devices

Fig. 10